STUDIES OF PACIFIC ISLAND PLANTS, II[1]
NOTES ON THE PACIFIC SPECIES OF PIPER

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In attempting to name a series of specimens of *Piper* L. from Fiji, kindly forwarded by the Curator of the Bernice P. Bishop Museum, it was found desirable to prepare a consideration of the known species of the genus in Fiji. In the course of this study, the species from adjacent Pacific groups were examined, and notes on two of the difficult complexes are here included. A revision of all the Pacific species is highly desirable, but this can scarcely be undertaken without examination of extensive collections and of types deposited in European herbaria. I am indebted to the authorities of the following institutions for the privilege of studying herbarium material, the place of deposit being indicated by the parenthetical letters: Arnold Arboretum (A), Bishop Museum (Bish), Gray Herbarium (GH), New York Botanical Garden (NY), University of California (UC), U. S. National Herbarium (US).

Piper puberulum (Benth.) Benth. and its varieties

The most common species of § *Macropiper* in Fiji, Samoa, and Tonga is the shrub with the following essential characters: petioles 1–4 cm. long, vaginate from one-half to nearly their entire length; leaf-blades ovate, of moderate size, generally up to 15 by 10 cm. but sometimes up to 22 by 17 cm., either puberulent beneath or glabrous on both surfaces, obtuse to rounded or subcordate at base, and with 5 or 7 (sometimes 9) nerves divergent from the petiole; spikes axillary, usually solitary but sometimes (especially in distal axils) paired, comparatively long, usually 7–17 cm. long at anthesis excluding peduncle (both staminate and pistillate), rarely 4–19 cm. long (scarcely mature when less than 7 cm.).

This is the plant commonly passing in herbaria and literature as *P. Macgillivrayi* C. DC. An examination of the various treatments of this species demonstrates that de Candolle's binomial must be replaced by *P. puberulum* (Benth.) Benth. ex Seem.

The first description referable to this species was that of Bentham in 1843, of *Macropiper puberulum*, based on a Fijian collection of Hinds and Barclay. De Candolle, in his later considerations of the species, obviously should have made use of this specific epithet, but instead he proposed the name *Piper Macgillivrayi*, which has been associated with the species through practically every consideration up to the present. That de Candolle was aware of Bentham's earlier name is obvious from his citation of *Macropiper puberulum* in synonymy, both in Seemann's Flora Vitiensis (1868) and in the Prodromus (1869); the manuscript for Seemann's work

[1]See Bull. Torrey Bot. Club **68**: 397–406. 1941.

may possibly not have been seen by de Candolle before publication. In this work we find the binomial *Piper puberulum* Benth. occurring twice, once parenthetically on page 262 in the "explanation of plate 75," and again on the plate itself. This mention of *Piper puberulum*, since it is accompanied by a detailed plate, is here accepted as an authentic transfer of Bentham's *Macropiper puberulum*. I have no doubt that Seemann used the binomial *Piper puberulum* in good faith on his plate, but was deterred from taking it up in his text because of his discovery of de Candolle's manuscript name.[2]

Numerous varieties have been proposed within the comprehensive concept of *P. Macgillivrayi*, based upon Fijian and Samoan specimens. For the most part these varieties appear properly placed, but I believe that var. *fasciculare* Warb. (10:609) is best removed from the species to *P. Timothianum*, as stated below in my detailed consideration of the Fijian species. Var. *glabrum* Warb. (10:609) appears to be both a homonym and a synonym of var. *glabrum* C. DC.; cotype material of Warburg's variety (*Reinecke 75* [US]) does not differ from the glabrous Fijian form upon which de Candolle's varietal name is based. I am unable to pass upon the proper position of the following Samoan varieties: *abbreviatum* Warb., *scandens* Warb. (for these see 10: 609), *subrotundifolium* C. DC. (4: 264), and *upoluanum* C. DC. (nomen?, see 5: 258). Students of the Samoan flora should consider whether these are worth retaining as trinomials under *P. puberulum*.

The following varieties of *P. Macgillivrayi* have been based upon Fijian collections: *parvifolium* C. DC. and *glabrum* C. DC. (2: 335). The first of these probably represents a depauperate form of the common glabrous-leaved variety of *P. puberulum*, but the second is difficult to interpret. De Candolle's description of var. *glabrum* reads merely: "foliis utrinque glabris," but the only specimen he cites is "*Seemann 567* ! in h. DC." *Macropiper puberulum* Seem. in Bonplandia 1861, p. 259 is cited as a synonym. On the basis of *Seemann 567* in the Kew Herbarium, Bentham's description of *Macropiper puberulum*, and Seemann's description and plate in Flora Vitiensis (1868), one might suppose that var. *glabrum* is actually typified by the puberulent-leaved form. However, it is obvious from the varietal name and from the phrase "foliis utrinque glabris" that de Can-

[2]One might suspect that de Candolle avoided Bentham's specific epithet because of an earlier *Piper puberulum*, but I cannot find that this is the case. No such binomial is listed by Index Kewensis, but de Candolle, in 1923 (5: 272), indexes a cryptic "Piper puberulum Maxim. Diagn. I, 512." This refers to *Piper puberulum* (Benth.) Maxim. in Bull. Acad. Sci. St. Pétersb. **31**: 94. 1886 [in Mél. Biol. Acad. Sci. St. Pétersb. **12**: 532. 1886], which is based on *Chavica puberula* Benth. Fl. Hongk. 335. 1861. Because Maximowicz' binomial in 1886 is a later homonym of *P. puberulum* Benth. ex Seem. (1868), the Hongkong plant should be known as *Piper hongkongense* C. DC. (2: 347). This latter binomial is accounted for in de Candolle's key (5: 201); it is based upon a Seemann specimen. *Chavica puberula* is based upon a Hance specimen, which was the source of the misdetermination "*Piper arcuatum* Seem. Bot. Herald 415. 1857; non Miq.," cited by both Bentham and Maximowicz. As the Hance collections were deposited in Seemann's herbarium, it seems very likely that *Piper hongkongense* and *Chavica puberula* are based upon parts of the same collection.

dolle did not intend this interpretation. The specimen of *Seemann 567* in the Gray Herbarium is a mixture, having large puberulent leaves from one plant and smaller glabrous leaves from another. I believe, therefore, that de Candolle's specimen of this collection was the glabrous form, and I propose to interpret var. *glabrum* according to his obvious intent and his description, that is, excluding the synonym *Macropiper puberulum* and the puberulent-leaved portion of *Seemann 567*.

In Fiji, *P. puberulum* is divisible into two varieties, which I designate below as var. *typicum* and var. *glabrum*.

Piper latifolium L. f. and its allies

The nomenclatural confusion which has been attached to this binomial is due to the fact that it first appeared in the Emendanda to the younger Linnaeus' Supplementum Plantarum (1781) and thus replaced that author's *Piper methysticum* as described on page 91 of the same work. One is therefore justified in considering *P. methysticum* L. f. as a name published in synonymy and in taking *P. latifolium* L. f. as the correct name for the Tahitian plant described on page 91 of Linnaeus' work. This plant is characterized by its several axillary spikes and cannot be confused with the widely cultivated "kava" or "yanggona," which was first botanically described by G. Forster (Pl. Esc. Ins. Oc. Austr. 76. 1786) as *Piper methysticum*. It does not appear necessary to take Forster's name as a later homonym of *P. methysticum* L. f., which, having been corrected by the author in the same original work, has no nomenclatural status. Practically all modern taxonomists who have considered the matter are in agreement with Moore (6), whose lucid discussion of the problem indicates that *Piper methysticum* Forst. f. is the correct name for the common cultivated "kava."

In a consideration of the Pacific species of *Piper*, one of the most difficult problems is to fix the geographic limits of *P. latifolium*. Although the species was originally based on a single collection from Tahiti, numerous writers have taken the species to include plants from as far west as Tonga and the New Hebrides. This extension of the range was probably first indicated by G. Forster (Fl. Ins. Austr. Prodr. 5. 1786). C. de Candolle, in 1869 (2: 335) notes the range as "in Ins. Tahiti, ins. Societatis, Amicorum, Novarum Hebridum, Timor," but subsequently (5: 172) there is an indication of uncertainty, as he states the range merely as "Tahiti, etc."

The only Tahitian specimens I have seen which match the original description and de Candolle's interpretation in his key (5: 172) are *U. S. Expl. Exped. 3*, in part (GH) and *Setchell & Parks 274* (UC), the latter being cited as such by Setchell (9: 163). Setchell implies that the species is endemic to Tahiti. However, I believe that F. Brown's reference of Marquesan specimens to *P. latifolium* (1: 17) is correct; the several specimens which Brown cites from the Austral Islands are not now available to me, and they may possibly be similar to the Raratongan plants discussed below.

Another species which must be considered in connection with *P. lati-*

folium is *P. tristachyon* C. DC. (2: 335), at least as regards its Tahitian components, the species having been based on material from both Tahiti and the Hawaiian group. According to de Candolle's key (5), *P. tristachyon* differs from *P. latifolium* primarily in its leaf-blades being pubescent beneath. The Tahitian form of *P. tristachyon* appears to be represented by *Setchell & Parks 341* (UC) (see Setchell, 9: 163), *Tilden 429* (GH), and *U. S. Expl. Exped. 1* ♂ (GH). While *P. tristachyon* is superficially distinct from *P. latifolium* on the basis of its crispate-pilose lower leaf-blades and petioles, it is perilously similar in its other characters, such as leaf-shape and petioles almost completely vaginate. In general, its leaf-blades are slightly broader in proportion than those of *P. latifolium* and with less pronounced apices. The probability that these two entities are not specifically distinct is strengthened by the occurrence in Tahiti of a plant precisely resembling *P. tristachyon* in all details except its completely glabrous habit. This is represented by *U. S. Expl. Exped. 1* ♀ (GH, US), and *Setchell & Parks 212* (UC) and *340* (UC). The latter two specimens have been referred, and probably correctly, by Setchell (9: 163) to *P. excelsum* var. *tahitianum* C. DC. This variety appears not to be conspecific with *P. excelsum* Forst. f. of New Zealand, which has quite different leaves and has fruits immersed in the rachis (C. DC., 5: 171). I believe that *P. excelsum* var. *tahitianum* should definitely be separated from the New Zealand species and placed in the synonymy of *P. tristachyon*, of which it is no more than a glabrous form. One may consider the advisability of referring all the Tahitian plants here discussed to *P. latifolium*, which would then be characterized chiefly by its long and nearly completely vaginate petioles, broad many-nerved leaves, and several (3–5) axillary spikes.

The three Tahitian entities here discussed (*P. latifolium*, *P. tristachyon*, and *P. excelsum* var. *tahitianum*), on the basis of material now available and without consultation of the types, are kept apart only with difficulty. An essentially similar conclusion has already been expressed by Nadeaud (Enum. Pl. Indig. Tahiti 41. 1873).

The occurrence of *P. latifolium* on Raratonga in the Cook Islands has been noted by Cheeseman (in Trans. Linn. Soc. II. Bot. **6:** 293. 1903) and Wilder (in Bishop Mus. Bull. 86: 38. 1931). The plant observed by them is apparently common on Raratonga and is represented by: *H. E. & S. T. Parks 22036* (GH, UC, US), *22211* (UC), and *22301* (A, UC, US), and *Wilder 3* (A, NY, UC). Superficially it differs from the Tahitian forms of *P. latifolium* in having its petioles only one-third to one-half vaginate; its staminate flowers have consistently 3 or 4 stamens, while those of the Tahitian specimens have either 2 or 3 stamens. For the present I have not seen enough material to decide whether a reasonable concept of *P. latifolium* may be extended to include this Raratongan form or whether the latter should be separated as a subspecific unit.

The occurrence of *P. latifolium* in the New Hebrides, noted by Forster in 1786, has been further recorded by several writers, including Miquel (Syst. Piper. 219. 1843), whose concept of the species included even such forms as *P. guahamense* C. DC. (2: 336). Guillaumin has more recently men-

tioned *P. latifolium* from the New Hebrides (in Bull. Soc. Bot. Fr. **66:** 275. 1919, op. cit. **74:** 703. 1927, in Jour. Arnold Arb. **13:** 82. 1932). Among the specimens upon which Guillaumin's concept was based, *Kajewski 3, 436,* and *718* (all A) are available to me, and the most detailed examination fails to reveal any consequential characters by which this New Hebrides plant can be distinguished from a concept of *P. latifolium* which includes the various Tahitian and Raratongan forms discussed above.

While my conclusions are admittedly based upon insufficient material, for the time being I follow earlier students in thus accrediting *P. latifolium* with a range extending from the Marquesas to the New Hebrides, although its absence from Fiji, among the collections now available from that group, must remain surprising. One may anticipate that examination of abundant Pacific material and comparison with the historic collections will reveal lines upon which this present concept of *P. latifolium* may be intelligibly divided.

The Fijian species of Piper

The only previous treatment of the Fijian species of *Piper* is that of de Candolle in 1909 (3). In this paper five new Fijian species were described, two of which I cannot accurately place, the types not being available. I am able to recognize ten indigenous Fijian species, the total thus being probably twelve. An additional three species, which occur in Fiji either in cultivation or as weeds, are included in this consideration, being the first three species in my key. The indigenous Fijian species fall into the Sections *Eupiper* and *Macropiper,* as outlined by de Candolle (5). In the present treatment I describe three new species, propose a new name for *P. polystachyum* C. DC., and take up *P. puberulum* as an older name than the well-known *P. Macgillivrayi* C. DC.

Spikes leaf-opposed, solitary; leaf-blades plinerved or pinnate-nerved, at least the inner nerves partially concurrent; stipules sometimes free and then the petioles unwinged.

Inflorescence-scales copiously pilose; leaf-blades narrowly oblong-elliptic, inequilaterally rotund-subcordate at base, scabrid above, puberulent beneath (at least on nerves), pinnate-nerved, the lateral nerves 4–7 per side, ascending; weed, native to America (§*Steffensia*) ..... 1. *P. aduncum.*

Inflorescence-scales glabrous; leaf-blades smooth above, not scabrid, plinerved, the principal nerves concurrent for less than half the length of the costa (pinnate-nerved in no. 7) (§ *Eupiper*).

Erect shrub; leaf-blades large, 13–25 × 10–20 cm. at maturity, deeply cordate at base, minutely puberulent on nerves beneath, the principal nerves 9–13, freely spreading from petiole except the 3 innermost, these loosely concurrent for 5–15 mm.; mature spikes (excl. peduncle) 2–6 cm. long; in Fiji only in cultivation ..... 2. *P. methysticum.*

Scandent plants (except no. 7); leaf-blades not exceeding 14 × 10 cm. (rarely toward base of liana up to 16 × 16 cm.), obtuse to shallowly cordate at base, the principal nerves 5–7, the inner ones firmly concurrent toward base.

Spikes at least 2 cm. long and usually much longer, on peduncles at least 6 mm. long; leaf-blades plinerved; scandent plants.

Fruits coalescing, fully embedded in pulp and concrescent with the rachis; filaments as broad as anthers; in Fiji only in cultivation ..... 3. *P. Betle.*

Fruits no more than semi-immersed in the rachis, not coalescing; filaments much narrower than anthers; indigenous in Fiji.

Stipules free, inconspicuous, 5–12 mm. long; leaf-blades with the inner nerves usually long-concurrent, the costa with obvious lateral nerves, the veinlets usually prominulous on both surfaces; ovaries and fruits semi-immersed in the rachis; stamens usually 4, sometimes 3, per flower, the anthers small, 0.15–0.25 × 0.3–0.4 mm. (♂ inflorescence not known in no. 5).

Plant glabrous throughout, or inflorescence-rachis sparsely pilose.....4. *P. insectifugum*.

Branchlets distally, petioles, peduncles, and leaf-blades on both surfaces crispate-hispid, the upper leaf-surface eventually subglabrescent; inflorescence-rachis densely pilose.....5. *P. crispatum*.

Stipules free or adnate to petiole, conspicuous, 15–22 mm. long; leaf-blades clearly plinerved, the inner 3 nerves concurrent for only 7–20 mm., the costa without important lateral nerves, the veinlets obscure or slightly impressed above; ovaries apparently free; stamens apparently 2 per flower, the anthers comparatively large, about 0.25 × 0.7 mm.....6. *P. stipulare*.

Spikes (at least ♀) 1–1.5 cm. long, on peduncles 2–4 mm. long; ovaries free, not immersed in the rachis; leaf-blades essentially pinnate-veined, with 2–4 pairs of secondaries; shrub.....7. *P. Degeneri*.

Spikes axillary; leaf-blades with nerves freely spreading from the petiole; stipules adnate to petioles, these at least partially vaginate; indigenous in Fiji (§ *Macropiper*).

Spikes solitary, sometimes paired in distal leaf-axils.

Leaf-blades hispid-pilose on both surfaces; inflorescence-scales ciliate-setose; carpels conspicuously narrowed toward apex and with obscure stigmas.....8. *P. oxycarpum*.

Leaf-blades glabrous at least above; inflorescence-scales not ciliate-setose; carpels essentially rounded at apex, with obvious stigmas.

Spikes 7–19 cm. long, excluding peduncle, rarely only 4 cm. but then scarcely mature; floral parts comparatively large, the scales 0.5–1.1 mm. in diameter; leaf-blades (7–)8–15(–22) by (3–)4–10(–17) cm., 5–9-nerved.

Leaf-blades puberulent beneath.....9a. *P. puberulum* var. *typicum*.

Leaf-blades glabrous on both surfaces.....9b. *P. puberulum* var. *glabrum*.

Spikes 2.5–5.5 cm. long at maturity, excluding peduncle; floral parts smaller, the scales 0.35–0.7 mm. in diameter; leaf-blades 6–11 by 2–5.5 cm., 3- or 5-nerved.....10. *P. melanostachyum*.

Spikes 3 or more per leaf-axil, rarely only 2.

Petioles of mature leaves 8–17 cm. long, usually vaginate only in the lower quarter; leaf-blades up to 25 by 28 cm., 11–13-nerved, cordate at base (deeply so on larger blades); spikes (at least ♂) 10–22 per leaf-axil.....11. *P. vitiense*.

Petioles shorter, 1–4.5 cm. long on mature leaves, vaginate nearly to apex or at least more than half their length; leaf-blades up to 17 by 15 cm., (5–)7–9-nerved, obtuse to subcordate at base; spikes (both ♂ and ♀) usually 3–5 per leaf-axil, rarely 2–7.

Spikes (both ♂ and ♀) 0.8–3.5 cm. long (excl. peduncle); stigmas glabrous or sparsely pilose.....12. *P. Timothianum*.

Spikes (at least ♀) 5–8 cm. long (excl. peduncle); stigmas densely and obviously pilose.....13. *P. kandavuense*.

1. **Piper** (§ *Steffensia*) **aduncum** L. Sp. Pl. 29. 1753; C. DC. in DC. Prodr. **16**(1): 285. 1869; B. E. Parham in Agr. Jour. Dept. Agr. Fiji **9**(3): 12. 1938.

DISTRIBUTION: Common throughout a large part of tropical America. Of recent introduction into Fiji; according to Parham, in 1938: "During the past five years this species of *Piper* has been noted as an aggressive weed plant in the south-eastern part of Viti Levu, it has apparently spread rapidly with Suva as the centre."

FIJI. VITI LEVU: Rewa: Lami, *Parks 20060* (Bish); between Suva and Lami,

Gillespie 2079 (A, Bish); 4 mi. west of Suva, *MacDaniels 1071* (Bish); Rewa or Naitasiri: Mt. Kombalevu, alt. 400 m., *Parks 20282* (Bish).

NATIVE NAME: *Yanggona ni Onolulu* (according to Parham; i. e. "Honolulu Piper," a misnomer, as the species is probably not found in Hawaii).

As it occurs in Fiji, the plant is a shrub or slender tree up to 8 m. high, occurring on roadsides or in bush-land, most often near cultivation. It has not been reported from any other Pacific group.

2. **Piper** (§ *Eupiper*) **methysticum** Forst. f. Pl. Esc. Ins. Oc. Austr. 76. 1786, Fl. Ins. Austr. Prodr. 5. 1786; Seem. Fl. Vit. 260. 1868; C. DC. in DC. Prodr. **16**(1): 354. 1869, in Candollea **1**: 180. 1923; non L. f. Suppl. 91 [as synonym of *L. latifolium* L. f. in Emendanda]. 1781.
Macropiper methysticum Miq. Comm. Phyt. 36. *pl. 4, D.* 1840, Syst. Piper. 217. 1843; B. E. Parham in Agr. Jour. Dept. Agr. Fiji **8**(1): 2. 1935.

DISTRIBUTION: Throughout the Pacific Islands from New Guinea and Micronesia eastward. The species is found only in cultivation, at least in Fiji, and its source is questionable. Doubtless it was carried eastward by the early inhabitants of the Pacific, and one may suspect that it is indigenous farther west than Fiji. Its roots are the source of the important native beverage, which, like the plant itself, passes under a multitude of native names. In Fiji both the plant and the drink are known as *yanggona* (also spelled "yaqona" or "yangona"). Forster mentioned no type specimen, giving the localities of Tahiti and the Tongan and Hawaiian groups. There appear to be no Fijian specimens in American herbaria, but the plant is found in every Fijian village where conditions are suitable.

I have cited above only the basic literature referring to *P. methysticum* and treatments specifically discussing the plant in Fiji. The nomenclatural problems pertaining to the binomial have been competently discussed by Moore (6). F. Brown's account (1: 18–19) discusses the numerous varieties cultivated in the Marquesas. Seemann (8: 260–261) has described the use of the plant in Fiji, while Parham (7) has recently written an interesting account of the species in Fiji, considering its varieties, methods of cultivation, disease-control, etc.

3. **Piper** (§ *Eupiper*) **Betle** L. Sp. Pl. 28. 1753; C. DC. in DC. Prodr. **16**(1): 359. 1869, in Candollea **1**: 189. 1923; Quisumbing in Philip. Jour. Sci. **43**: 85. 1930; Jan in Agr. Jour. Dept. Agr. Fiji **8**(4): 49. 1937.

DISTRIBUTION: Malaya to India, widely cultivated throughout the tropics. The common betel pepper is used and cultivated to a certain extent by the Indian population of Fiji, as indicated by the discussion of Jan cited above. I have seen no herbarium specimens of the plant from Fiji.

4. **Piper** (§ *Eupiper*) **insectifugum** C. DC. ex Seem. Fl. Vit. 262. 1868, in DC. Prodr. **16**(1): 354. 1869; Bülow in Gartenflora **45**: 575. 1896; C. DC. in Jour. Linn. Soc. Bot. **39**: 164. 1909, in Candollea **1**: 178. 1923.

DISTRIBUTION: Fairly common in Fiji, where it occurs in forest or open woods at elevations up to 800 m. In habit it is a subscandent shrub, becoming a high-climbing liana; hence its native name in Fiji is *wa kawa* or *wa nggawa* (i. e. climbing Piper). The occurrence of the species in Samoa is noted only by Bülow, as indicated above, and possibly it is endemic to Fiji.

FIJI. VITI LEVU: *Seemann 569* ♂ (TYPE COLL., GH); Tholo North: Vicinity of Nandarivatu, *Degener & Ordonez 13568* ster. (A, NY), *Degener 14368* fr. (A, NY, UC, US), *Greenwood 867* ster. (A); Rewa: Korombamba Mt., *Gillespie 2315* ster. (A, Bish). KANDAVU: Above Namalata and Ngaloa Bays, *Smith 75* ♂ (Bish, GH, NY, UC, US). VANUA LEVU: Mbua: Seatovo Range, *Smith 1545* ♂ (Bish, GH, NY, UC, US); Thakaundrove: Savu Savu Bay region, *Degener & Ordonez*

13907 ♂ (A, NY, UC, US). TAVEUNI: Western slope between Somosomo and Wairiki, *Smith 841* ♂ (Bish, GH, NY, UC, US). WITHOUT DEFINITE LOCALITY: *Gillespie 2209* ♂ (A, Bish), *2225* ster. (Bish), *3876* ♂ (A, Bish).

This distinctive climbing species of § *Eupiper* is not correctly placed in de Candolle's key (5: 178). The stigmas are 3 and sessile, rather than 2 and on a style, while the stamens are 3 or 4 per flower. The presence of 4 stamens in flowers of § *Eupiper* is not indicated by de Candolle (5: 176), but there can be no doubt of the proper place of *P. insectifugum* in this section. Its actual alliance is difficult to ascertain, but its leaves are sometimes remarkably similar to those of *P. Betle*; in inflorescence characters the two species are quite different, and *P. Betle* is not indigenous in Fiji.

5. **Piper** (§ *Eupiper*) **crispatum** sp. nov.

Frutex scandens, ramulis apicem versus, petiolis, laminis utrinque, et pedunculis pilis stramineis vel pallide brunneis crispatis multicellulatis 0.5–1.5 mm. longis debiliter hispidis; ramulis subteretibus gracilibus nodis conspicue incrassatis et mox disarticulatis, internodiis apicem ramulorum versus 1–3.5 cm. longis; stipulis apice ramulorum lanceolatis ad 1 cm. longis hirtellis mox caducis; foliis alternatis, petiolis paullo canaliculatis 10–16 mm. longis, laminis chartaceis in sicco brunneis ovatis, 9–13 cm. longis, 6–8 cm. latis, basi inaequilateraliter rotundatis, apice gradatim acuminatis (acumine ipso 1–2 cm. longo ad apicem nervis marginalibus picto), margine integris, supra demum subglabrescentibus, plerumque 5-pli-nerviis, nervis paullo supra basim orientibus, costa utrinque valida superne nervos secundarios laterales conspicuos utrinsecus 2–4 utrinque valde prominulos mittente, nervis secundariis marginem versus anastomosantibus, rete venularum intricato utrinque plus minusve prominulo; inflorescentiis ♀ solis visis apicem ramulorum versus oppositifoliis, pedunculis 10–17 mm. longis, spicis sub anthesi gracilibus 4–5 cm. longis, rhachi pilis multicellulatis circiter 0.5 mm. longis dense pilosa; bracteis primo imbricatis membranaceis peltatis inconspicue glanduloso-punctatis 1–1.2 mm. diametro breviter stipitatis; ovario in rhachi semi-immerso rotundato-conico sub anthesi circiter 0.4 mm. diametro, stigmatibus ut videtur 3 minutis.

DISTRIBUTION: Known only from the type collection.

FIJI. WITHOUT DEFINITE LOCALITY: *Gillespie 3092* ♀ (A, Bish, TYPE), 1927–28 (woody vine, scrambling on tree).

Although doubtless a close relative of *P. insectifugum*, this plant seems specifically distinct by virtue of its crispate-hispid parts, as mentioned in my key. The numerous specimens of *P. insectifugum* examined bear no trace of the characteristic pubescence of the new species.

6. **Piper** (§ *Eupiper*) **stipulare** sp. nov.

Frutex dioecus scandens ubique praeter rhachem inflorescentiae interdum obscure pilosam glaber, ramulis gracilibus subteretibus nodis incrassatis, internodiis apicem ramulorum versus 1.5–6 cm. longis; stipulis liberis vel raro petiolo adnatis conspicuis oblongis 15–22 mm. longis interdum subpersistentibus; foliis alternatis, petiolis gracilibus 12–17 mm. longis, laminis chartaceis in sicco brunneo-olivaceis ovatis vel elliptico-ovatis, (7–)10–14 cm. longis, (4–)6–10.5 cm. latis, basi inaequilateraliter obtusis vel rotundatis, apice cuspidato-acuminatis (acumine ipso 5–10

mm. longo), margine integris, 7-pli-nerviis, nervis cum costa supra paullo subtus valde elevatis, interioribus 7–20 mm. concurrentibus apicem attingentibus, aliis antea evanescentibus, rete venularum obscuro vel subtus leviter prominulo; inflorescentiis ♂ et ♀ apicem ramulorum versus oppositifoliis, pedunculis 7–10 mm. longis, spicis sub anthesi gracilibus 4–5 cm. longis; bracteis membranaceis peltatis obscure pellucido-punctatis 0.7–0.8 mm. diametro breviter (ad 0.2 mm.) stipitatis; staminibus ut videtur 2, antheris subsessilibus subreniformibus vel transverse ellipsoideis, circiter 0.25 × 0.7 mm.; ovario ut videtur libero obscure luteo-glanduloso ovoideo-subgloboso sub anthesi circiter 0.7 mm. diametro, stigmatibus 3 sessilibus 0.3 mm. longis.

DISTRIBUTION: Known only from Viti Levu.

FIJI. VITU LEVU: *Parks 20879* ♂ (Bish); Namosi: 2 miles from Namuamua, in woods near Namosi trail, alt. 300 m., *Gillespie 3074*, with decomposed spikes (A, Bish) (thick vine, climbing on tree); Naitasiri: 7.5 miles from Suva, near road past Tamavua village, in woods, alt. 150 m., *Gillespie 2423* ♀ (A, Bish, TYPE), Aug. 27, 1927.

Piper stipulare is probably most closely allied to *P. Graeffei* Warb. and the several other Samoan species of § *Eupiper* proposed by C. de Candolle. However, it is distinguished from all of these by its large and often persistent stipules and its much shorter spikes.

7. **Piper** (§ *Eupiper*) **Degeneri** A. C. Sm. in Sargentia **1:** 10. 1942.

DISTRIBUTION: Known only from the type collection.

FIJI. VANUA LEVU: Thakaundrove: Eastern drainage of Yanawai River, alt. 150 m., *Degener & Ordonez 14096* ♀ (A, TYPE, NY).

As remarked in the original consideration, this very distinct and apparently rare species has no close relatives in the Pacific.

8. **Piper** (§ *Macropiper*) **oxycarpum** C. DC. in Jour. Linn. Soc. Bot. **39:** 164. 1909, in Candollea **1:** 171. 1923.

DISTRIBUTION: Endemic to Fiji and probably limited to the higher hills in the interior of Viti Levu. The type is *Gibbs 604*, from Nandarivatu, Tholo North.

FIJI. VITI LEVU: In forest at 1250 m., *Parks 20738* ♀ (A, Bish); Tholo North: Nandarivatu, in open bush, alt. 1000 m., *Parks 20572* ♀ (Bish). WITHOUT DEFINITE LOCALITY: *Gillespie 3839* ♀ (Bish).

This very distinct species is at once distinguished from all other members of § *Macropiper* by having its branchlets distally, petioles, peduncles, and leaf-blades on both surfaces conspicuously hispid-pilose, its inflorescence-scales densely ciliate-setose, and its carpels conspicuously narrowed toward the apex and bearing 2 or 3 very obscure stigmas. Other essential characters of the species are as follows: petioles 1–3 cm. long, one-half to three-quarters vaginate; leaf-blades ovate, 8–17 cm. long, 5–12 cm. broad, subcordate at base, gradually acuminate at apex, 7- or sometime 9-nerved; spikes (at least ♀) solitary, 5–11 cm. long excluding peduncles, these slender, 2.5–5 cm. long. According to de Candolle the type collection is from a shrub 2 m. high.

9. **Piper** (§ *Macropiper*) **puberulum** (Benth.) Benth. ex Seem. Fl. Vit. 262, as synonym, and *pl. 75*. 1868; non *P. puberulum* Maxim. (1886).
Macropiper puberulum Benth. in Hook. Lond. Jour. Bot. **2:** 235. 1843.

Piper Macgillivrayi C. DC. ex Seem. Fl. Vit. 262. 1868; C. DC.[3] in DC. Prodr. **16**(1): 335. 1869; Engl. in Bot. Jahrb. **7:** 450. 1886, in Forschung. "Gazelle" **4:** Siphon. 25. 1889; C. DC. in Denkschr. Akad. Wiss. Wien **85:** 264. 1910; Turrill in Jour. Linn. Soc. Bot. **43:** 35. 1915.

DISTRIBUTION: Fiji, Samoa, Tonga, and probably some of the adjacent groups. In Fiji the species is reported as a low erect shrub up to 3 m. high, occurring at altitudes from sea-level up to 900 m. or possibly higher. Var. *typicum* occurs in thickets or on the edges of forest, apparently only below 500 m., being especially common in coastal thickets. Var. *glabrum* usually occurs in the forest and is not reported from the immediate coast. The species is known throughout Fiji as *yanggoyanggona* (often spelled "yaqoyaqona"). The two varieties recognized from Fiji are not very sharply differentiated and their value is dubious. Both varieties occur in Samoa, but I have seen only var. *glabrum* from Tonga.

The necessity of replacing the well-known binomial *P. Macgillivrayi* is pointed out in my discussion above, where I also consider the typification of the species and the two varieties which are known from Fiji.

9a. **Piper puberulum** var. **typicum** nom. nov.

Macropiper puberulum Benth. in Hook. Lond. Jour. Bot. **2:** 235. 1843; Miq. Syst. Piper. 221. 1843; Seem. in Bonplandia **9:** 259. 1861, in Jour. Bot. **2:** 73. 1864.

Piper puberulum Benth. ex Seem. Fl. Vit. 262, as synonym, and *pl. 75.* 1868; Bülow in Gartenflora **45:** 575, nomen. 1896.

Piper Macgillivrayi C. DC. ex Seem. Fl. Vit. 262. 1868, in Candollea **1:** 172. 1923.

Foliorum laminae subtus puberulae.

FIJI. VITI LEVU: *Parks 20173,* in part, ♀ (Bish), *20611* ♀ (Bish); Lautoka: North of Natalau, *Degener 15005* ♂ (A, NY, UC, US); Tholo West: Mbulu, *Degener 15042* ♀ (A, NY, UC, US). KANDAVU: Above Namalata and Ngaloa Bays, *Smith 56* ♀ (Bish, GH, NY, UC, US), *115* ♀ (Bish, GH, NY, UC, US); Mt. Mbuke Levu, *Smith 210* ♀ (Bish, GH, NY, UC, US). OVALAU: *U. S. Expl. Exped. 1,* in part, ♀ (GH). KORO: East coast, *Smith 1105* ♀ (Bish, GH, NY, UC, US). VANUA LEVU: *U. S. Expl. Exped. 1,* in part ♀ (GH); Thakaundrove: Savu Savu Bay region, *Degener & Ordonez 13871* fr. (A, NY, UC, US). VANUA MBALAVU: *Smith 1408* ♀ (Bish, NY). FULANGA: *Smith 1137* ♀ (Bish, NY). WITHOUT DEFINITE LOCALITY: *Seemann 567,* in part, ♀ (cotype coll. of *Piper Macgillivrayi,* GH), *Prince* (GH).

It should be noted that some specimens here cited (e.g. *Smith 115* and *Degener & Ordonez 13871*) bear essentially glabrous leaves on the same branches with puberulent leaves. The possibility that the degree of pubescence is merely a concomitant of shade conditions is thus indicated, and it may be questioned whether the two varieties have any genetic foundation.

9b. **Piper puberulum** var. **glabrum** (C. DC.) comb. nov.

Piper Macgillivrayi var. *glabrum* C. DC. in DC. Prodr. **16**(1): 335, excl. syn. *Macropiper puberulum.* 1869; Warb. (as var. nov.) in Bot. Jahrb. **25:** 609. 1898; C. DC. in Jour. Linn. Soc. Bot. **39:** 162. 1909, in Denkschr. Akad. Wiss. Wien **85:** 264. 1910, in Candollea **1:** 172. 1923.

Piper Macgillivrayi sensu Hemsl.[4] in Jour. Linn. Soc. Bot. **30:** 189. 1894; Burkill in Jour. Linn. Soc. Bot. **35:** 52. 1901.

[3]The cited references to *P. Macgillivrayi,* with the exception of the first, cannot be referred to a definite variety and therefore are listed under the species as an inclusive concept.

[4]The numerous Tongan specimens I have seen belong to var. *glabrum,* and it seems likely that only this variety occurs in Tonga; hence I have cited literature referring to Tongan collections here.

Leaf-blades glabrous on both surfaces.

FIJI. VITI LEVU: *Gillespie 2687* ♀ (Bish), *Parks 20173,* in part, fr. (Bish), *20232* ♀ (Bish), *20452* fr. (A, Bish), *20731* fr. (Bish), *20735* ♀, fr. (A, Bish); Tholo North: Vicinity of Nandarivatu, *Parks 20606* fr. (Bish), *Degener & Ordonez 13569* fr. (A, NY, UC, US), *Degener 14361* fr. (A), *14659* fr. (A, NY); Namosi: Voma Mt., *Gillespie 2927* ♀ (Bish); Serua: Vicinity of Ngaloa, *Degener 15140* ♂ (A, NY), *15179* ♂, ☿[5] (A, NY, UC, US); Rewa: Mt. Korombamba, *Gillespie 2235* fr. (Bish). KANDAVU: Above Namalata and Ngaloa Bays, *Smith 167* ♀ (Bish, GH, NY, UC, US). OVALAU: *U. S. Expl. Exped.* ♀ (GH). VANUA LEVU: Thakaundrove: Savu Savu Bay region, *Smith 331* ♀ (Bish, GH, NY, UC, US), *395* ♀, fr. (Bish, GH, NY, UC, US), *Degener & Ordonez 13829* fr. (A, NY), *13908* ♀, fr. (A, NY, UC, US), *13967* fr. (A, NY); Maravu, near Salt Lake, *Degener & Ordonez 14156* fr. (A, NY, UC, US). WITHOUT DEFINITE LOCALITY: *Seemann 567,* in part, ♀ (TYPE COLL. of *Piper Macgillivrayi* var. *glabrum,* GH), *Gillespie 2697* ♀ (A, Bish), *2698* ♀ (Bish), *2914* fr. (Bish), *3004* ♂ (Bish), *3307.4* ♀ (A, Bish), *4658* ♀ (A, Bish).

10. **Piper** (§ *Macropiper*) **melanostachyum** C. DC. in Jour. Linn. Soc. Bot. **39:** 162. 1909, in Candollea **1:** 172. 1923.

DISTRIBUTION: Endemic to Fiji and possibly limited to Viti Levu. The type is *Gibbs 703,* from Nandarivatu, Tholo North.

FIJI. VITI LEVU: Tholo North: Nandarivatu, alt. 1000 m., *Parks 20546* fr. (Bish); Tholo West: Uluvatu, vicinity of Mbelo, near Vatukarasa, *Tabualewa 15556* ♂ (A, NY, UC, US); Rewa: Korombamba Mt., alt. 400–550 m., *Gillespie 2217* ♂ (A, Bish), *2350* ♀ (A, Bish). WITHOUT DEFINITE LOCALITY: *U. S. Expl. Exped. 3* ♂ (GH).

According to de Candolle, this is a slender shrub 1.5 m. high; the above-cited collections have no habit data. The plant probably occurs in woods or forests at middle elevations, although the Tabualewa and U. S. Exploring Expedition collections may have been obtained near sea-level. The essential characters of the species are as follows: petioles 0.8–2 cm. long, vaginate one-half or nearly all their length; leaf-blades ovate-oblong, 6–11 cm. long, 2–5.5 cm. broad, acute to obtuse at base, gradually acuminate at apex, 3- or 5-nerved from the petiole; spikes solitary, axillary, slender, short (2.5–5.5 cm. long excluding peduncle, even at anthesis or in fruit). In floral characters, *P. melanostachyum* differs from *P. puberulum* only in its slightly smaller parts, the peltate scales being 0.35–0.7 mm. in diameter; the minute stamens and the stigmas are always three.

Although this plant may be only a montane derivative from the common *P. puberulum,* I am inclined to agree with de Candolle in granting it specific status, at least until more adequate material establishes a complete series of forms between the two entities.

11. **Piper** (§ *Macropiper*) **vitiense** nom. nov.
Piper latifolium sensu Seem. Fl. Vit. 261, quoad spec. vit. 1868; non L. f.
Piper polystachyum C. DC. in Jour. Linn. Soc. Bot. **39:** 162. 1909, in Candollea **1:** 172. 1923; A. C. Sm. in Bishop Mus. Bull. **141:** 25. 1936; non *Piper polystachyon* Ait. Hort. Kew. **1:** 49. 1789 (= *Peperomia polystachya*).

[5]*Degener 15179* is remarkable for its polygamo-monoecious character, some spikes having only staminate flowers while others on the same plant have hermaphrodite flowers. The latter bear three stamens around a normal ovary. This is the only specimen of § *Macropiper* I have seen with hermaphrodite flowers, but it scarcely weakens the characters of the section as defined by de Candolle (5: 171).

DISTRIBUTION: Endemic to Fiji, or possibly also in the New Hebrides. Occurring in Fiji at elevations of 600 to 1100 m. in forest, often common locally. The type is *Gibbs 794*, from Nandarivatu, Tholo North, Viti Levu.

FIJI. VITI LEVU: Namosi: Naitarandamu Mt., *Gillespie 3360* ♀ (A, Bish). VANUA LEVU: Thakaundrove: Mt. Mariko, *Smith 458* ♂ (Bish, GH, NY, US). TAVEUNI: *Seemann 566* ster. (GH); Mt. Manuka, *Smith 791* ♂ (Bish, NY). WITHOUT DEFINITE LOCALITY: *Gillespie 3123* ♂ (A, Bish). See also Smith in 1936.

A new name is needed for de Candolle's species because of the earlier *Piper polystachyon* Ait. The epithets *polystachyon* and *polystachyum* must be considered orthographic variants, according to Article 70 of the International Rules of Botanical Nomenclature, 1935.

Piper vitiense, a member of the general alliance of *P. latifolium* L. f., differs from that species and its other relatives in its long-petiolate large-bladed leaves and its numerous long-pedunculate staminate inflorescences. Mature leaves of our specimens have the petioles up to 17 cm. long and the sheaths 2.5–3.5 cm. long; in general the petioles are vaginate only in the lower quarter, while *P. latifolium* has sheaths usually nearly as long as the petioles. The largest leaf-blades of *P. vitiense* now available are up to 25 by 28 cm. and 13-nerved. The number of staminate spikes in the leaf-axils is somewhat more variable than the 14 described by de Candolle. Our material shows these spikes to be about 10–22 in number, giving the species its most distinctive character. The staminate spikes are up to 6 cm. long and are borne on slender peduncles up to 5 cm. long. The only available pistillate specimen, *Gillespie 3360*, has broken detached spikes, which offer no unusual character except as to number (which one may anticipate approaches the number of staminate spikes); the stigmas are 3, as usual in this section of the genus.

12. **Piper** (§ *Macropiper*) **Timothianum** A. C. Sm. in Sargentia **1:** 10. 1942.

Piper Macgillivrayi var. *fasciculare* Warb. in Bot. Jahrb. **25:** 609, as "*fascicularis*." 1898; C. DC. in Denkschr. Akad. Wiss. Wien **85:** 264, as "*fascicularis*." 1910, in Ann. Cons. Jard. Bot. Genève **15:** 232, as "*fascicularis*." 1912; Turrill in Jour. Linn. Soc. Bot. **43:** 35, as "*fascicularis*." 1915; C. DC. in Candollea **1:** 172. 1923; Christoph. in Bishop Mus. Bull. **154:** 5. 1938.

Piper fascicularis (sic) vel *fasciculatum* Rechinger in Karsten & Schenck, Vegetationsbilder **6:** *pl. 5*. 1908; non *P. fasciculare* Rudge, Pl. Guian. Rar. **1:** 9. *pl. 4*. 1805 (= *Lacistema* sp.); non *P. fasciculatum* Ruiz & Pav. Syst. Veg. **1:** 362. 1798.

Piper Macgillivrayi var. *fascicularis* (sic) forma *b* C. DC. in Jour. Linn. Soc. Bot. **39:** 162. 1909.

DISTRIBUTION: Fiji and Samoa. In Fiji the species is common locally in rain-forest and ridge-thickets of Viti Levu at elevations of 550–1200 m.; it is a shrub 2–5 m. high. In Samoa (as *P. Macgillivrayi* var. *fasciculare*) it is said to occur in some abundance on Savaii and Upolu, in essentially similar habitats at elevations up to 1500 m.

FIJI. VITI LEVU: Tholo North: Nandarivatu, *Degener & Ordonez 13570* ♀ (A, TYPE, NY, UC, US), *Parks 20777* ♂ (Bish), *20786* fr. (Bish), *Gillespie 4214* fr. (A, Bish); Nauwanga, *Degener 14360* fr. (A, NY, UC, US), *14620* fr. (A, NY); Nandrau, *Degener 14891* fr. (A, NY); Namosi: Vicinity of Namosi, *Gillespie 2688* ♀ (A, Bish), *Parks 20238* fr. (Bish), *20251* fr. (Bish); Korombasambasanga Mt., *B. E. Parham 2212* fr. (A). VANUA LEVU: Thakaundrove-Mathuata boundary: Korotini Range, *Smith 548* ♀ (Bish, GH, NY, UC, US). WITHOUT DEFINITE LOCALITY: *Gillespie 2782* ♀ (Bish), *3124* fr. (Bish).

In proposing this entity as a new species in 1942, I considered its simi-

larity to the Samoan plant which has been passing as *P. Macgillivrayi* var. *fasciculare*, but it seemed to me at that time, as at present, that the plant cannot be placed in "*P. Macgillivrayi*" (i.e. *P. puberulum*, as defined in the present treatment) without undue expansion of that concept. The other varieties of *P. puberulum* have the spikes usually solitary, but sometimes those at the upper nodes are paired. *Piper Timothianum*, on the other hand, has the spikes normally 3–7 per axil, very rarely 2. Several students of the Samoan flora, including Christophersen in 1938, have remarked that the number of spikes may vary from 1 to 4, but I have not observed fewer than 2 (and this very rarely) in the cited Fijian material. Furthermore the spikes (excluding peduncles), both staminate and pistillate, are only 0.8–3.5 cm. long. Christophersen finds that Samoan plants may have the pistillate spikes up to 5 cm. long and the staminate up to 10 cm. *Piper puberulum*, in the sense adopted by me, has the spikes between 4 and 19 cm. long, but the spikes of either sex are rarely less than about 7 cm. long. Although the two species are doubtless closely related and quite possibly interfertile, I fail to see how the present entity can be included in *P. puberulum* without expanding that concept to an unwarranted degree, perhaps even submerging it in *P. latifolium* L. f. Few students of *Piper* will wish to combine species to this extent, in which case the whole Section *Macropiper* would scarcely be divisible into species.

Apparently only Rechinger, in 1908, has thought *P. Macgillivrayi* var. *fasciculare* worthy of specific rank; he used the specific epithets "*fasciculatum*" indiscriminately, but neither is available for use in *Piper*. The plant was collected at Nandarivatu by both Gibbs and im Thurn, whose specimens were referred to Warburg's variety by de Candolle and Turrill.

13. **Piper** (§ *Macropiper*) **kandavuense** sp. nov.

Frutex 3 m. altus ubique inflorescentia excepta glaber, ramulis teretibus nodis valde incrassatis, internodiis apicem ramulorum versus 2–6 cm. longis; foliis alternatis, petiolis 2–3 cm. longis fere ad apicem conspicue vaginantibus (alis 3–4 mm. latis superne ad petiolum abrupte decurrentibus), laminis chartaceis in sicco olivaceis late ovatis, 10–15 cm. longis, 8–14 cm. latis, basi truncato-subcordatis, apice cuspidato-acuminatis, margine integris, 7(vel inconspicue 9-)-nerviis, nervis e basi divergentibus utrinque conspicue elevatis, rete venularum utrinque haud prominulo; inflorescentiis ♀ solis visis in axillis foliorum apicem ramulorum versus 4 vel 5 aggregatis, pedunculis validis glabris 1–2 cm. longis, spicis paullo post anthesin 2–3 mm. diametro 5–8 cm. longis; rhachi pilis pallidis 0.2–0.4 mm. longis sparse pubescente; bracteis liberis peltatis membranaceis circiter 0.8 mm. diametro breviter stipitatis; ovario globoso-ellipsoideo circiter 1 mm. diametro (immaturo), apice rotundato, stigmatibus 3 patentibus circiter 0.3 mm. longis dense et conspicue brunneo-pilosis et ciliatis coronato.

DISTRIBUTION: Known only from the type collection.

FIJI. KANDAVU: Mt. Mbuke Levu, alt. 200–500 m., *Smith 219* ♀ (Bish, GH, TYPE, NY, UC, US), Oct. 23, 1933 (shrub 3 m. high, in dense forest).

The specimen above described belongs among the allies of *P. latifolium*

L. f., but in several details it differs from my concept of that species. On the whole, it has shorter petioles than *P. latifolium,* at least on leaves of comparable size and maturity, and its petiolar sheaths are slighly broader in proportion and more abrupt distally. In the material of *P. latifolium* which I have seen from the eastern Pacific, the spikes, both staminate and pistillate, are never more than 3, but the original description states that the spikes are 5 or more; whether the original specimen was staminate or pistillate is not stated. Although the stigmas of *P. latifolium* are glandular-puberulent, they are never as conspicuously pilose as those of *Smith 219.*

In view of these differences, and especially the difference pertaining to the stigmatic character, I doubt if *Smith 219* can be referred to *P. latifolium.* No Fijian specimen which has yet come to my attention seems to agree precisely with material of *P. latifolium* from the eastern Pacific, but *Smith 219* seems closest, among Fijian plants, to Linnaeus' species, the limits of which are not yet entirely understood, as stated above.

INSUFFICIENTLY KNOWN ENTITIES FROM FIJI

PIPER (§ *Macropiper*) MACGILLIVRAYI C. DC. var. PARVIFOLIUM C. DC. in DC. Prodr. **16**(1): 335. 1869.

De Candolle's whole treatment of this is as follows: " . . . limbis 0,06 longis, 0,03 latis 5–7-nerviis . . . In ins. Fijee (Barclay ! in h. Kew.)." Leaves with these small dimensions have been observed among the available Fijian collections only on plants referred to *P. melanostachyum* C. DC., in which the leaf-blades are not 7-nerved. It seems probable that *P. Macgillivrayi* var. *parvifolium* is a very depauperate individual of *P. puberulum* var. *glabrum.*

PIPER (§ *Macropiper*) GIBBSIAE C. DC. in Jour. Linn. Soc. Bot. **39:** 163. 1909, in Candollea **1:** 173. 1923.

According to de Candolle, this species is characterized by its small leaf-blades (8 × 3.5 cm.), which are densely hirtellous beneath and 7-nerved, its hirtellous petioles and peduncles, its short pistillate spikes (3.5 cm. long), and especially its hirsute ovaries. On the basis of the original description this appears to be a distinct species, suggestive of *P. oxycarpum* and possibly *P. puberulum* var. *typicum.* No Fijian material available to me can be referred to *P. Gibbsiae,* which I hesitate to place without seeing the type, *Gibbs 722,* from Nandarivatu, Tholo North, Viti Levu.

PIPER (§ *Macropiper*) ERECTISPICUM C. DC. in Jour. Linn. Soc. Bot. **39:** 163. 1909, in Candollea **1:** 173. 1923.

From the original description and de Candolle's key (5: 173), one may assume that this species is a close relative of *P. Gibbsiae,* differing chiefly in its slightly larger (13 × 5.8 cm.) and more obviously acuminate leaf-blades, longer pistillate spikes (6 cm. long), and more sparsely pilose ovaries. Without examining the type, it is inadvisable to draw conclusions as to the value of the species, which is based on *Gibbs 599,* from Nandarivatu, Tholo North, Viti Levu.

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